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Preparation and Evaluation of Herbal Cream Formulated from *Calotropis gigantea* Leaves

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ABSTRACT
The present study aimed to formulate and evaluate a topical herbal cream using the leaf extract of *Calotropis gigantea*. Medicinal plants serve as an important source of bioactive compounds with significant therapeutic potential. *Calotropis gigantea*, widely used in traditional medicine, possesses antimicrobial, anti-inflammatory, and wound-healing properties. Fresh leaves were collected, authenticated, shade dried, pulverized, and subjected to Maceration extraction using propylene glycol. Preliminary phytochemical screening confirmed the presence of alkaloids, flavonoids, tannins, glycosides, saponins, and terpenoids. An oil-in-water (O/W) emulsion-based cream was formulated using suitable excipients. Four trial formulations (F1C–F4C) were prepared and evaluated for physicochemical properties including organoleptic characteristics, pH, spreadability, washability, phase separation, and skin irritation. The prepared formulations showed smooth texture, faint yellow color, pleasant odor, and semi-solid consistency. No irritation, erythema, edema, or phase separation was observed. Spreadability values indicated good applicability. The optimized formulation exhibited acceptable pH suitable for skin application. The study confirms the feasibility of developing a stable and safe herbal topical preparation using *Calotropis gigantea* leaf extract with potential therapeutic applications.
Keywords: Calotropis gigantea, Herbal cream, Oil-in-water emulsion, Phytochemical screening, Spreadability, Topical formulation, Wound healing, Anti-microbial activity.

Introduction

Medicinal plants have been used since ancient times as primary sources of therapeutic agents. India is one of the twelve mega-biodiversity countries in the world and possesses enormous genetic diversity of medicinal plants used in traditional systems such as Ayurveda, Siddha, and Unani [1,2]. Natural products continue to play a crucial role in modern drug discovery due to their structural diversity and pharmacological activities. Nearly half of the currently used drugs are derived directly or indirectly from natural sources [6].

Phytochemicals such as alkaloids, flavonoids, tannins, glycosides, terpenoids, steroids, and phenolic compounds are secondary metabolites responsible for the therapeutic effects of medicinal plants [3-8]. These compounds have been widely studied for antimicrobial, anti-inflammatory, antioxidant, wound-healing properties. *Calotropis gigantea* (Family: Asclepiadaceae) is a well-known medicinal shrub commonly referred to as Giant Milkweed or Crown Flower. It is widely distributed in Asian countries including India, Sri Lanka, Indonesia, Pakistan, and China [9,10]. The plant has been extensively described in classical Indian medicinal literature for its therapeutic applications [11]. Traditionally, various parts of *Calotropis gigantea* have been used for the treatment of skin disorders, wounds, inflammation, digestive disturbances, sprains, and microbial infections [12]. Phytochemical investigations reveal that the plant contains flavonoids, alkaloids, tannins, glycosides, and terpenoids which contribute to its biological activities [3,13]. Previous studies have reported significant antimicrobial and anti-inflammatory activity of the leaf extract of *Calotropis gigantea* [14].Topical drug delivery systems such as creams are widely used for localized skin therapy due to improved patient compliance, reduced systemic side effects, and ease of application [16,17]. Oil-in-water (O/W) creams are particularly advantageous because of their non-greasy nature, better spreadability, and easy washability [18]. Herbal creams formulated using plant extracts offer safer, eco-friendly, and cost-effective alternatives to synthetic formulations [5]. Considering the traditional claims and pharmacological potential of *Calotropis gigantea*, the present study was undertaken to prepare and evaluate an oil-in-water herbal cream containing its ethanolic leaf extract and to assess its physicochemical and dermatological safety parameters.

Materials and Methods

Plant Material Collection and Authentication

Fresh leaves of *Calotropis gigantea* were collected during the flowering season from the college campus. The collected plant

material was authenticated by a qualified taxonomist Dr. K, Madhava Chetty, Assistant Professor, from the Department of Botany, S V University, Tirupati. A voucher specimen was prepared and deposited in the herbarium for future reference.

Preparation of Plant Extract: The collected leaves were washed with distilled water & shade-dried at room temperature (25–30°C) for 10–14 days. The dried leaves were pulverized, sieved (40). The powdered material was subjected to maceration extraction using propylene glycol for 24-72 hr. The extract was filtered, concentrated under reduced pressure using a rotary evaporator, dried to semi-solid mass, and stored at 4°C.

Preliminary Phytochemical Screening

The extract was qualitatively tested for: Alkaloids (Mayer's test), Flavonoids (Shinoda test), Tannins (Ferric chloride test), Saponins (Froth test), Glycosides (Keller– Killiani test), Terpenoids (Salkowski test)

Formulation of Herbal Cream: An oil-in-water (O/W) emulsion cream was selected for formulation.

Oil Phase: Stearic acid, cetyl alcohol, beeswax, lanolin, and liquid paraffin were melted at 70°C.

Aqueous Phase: Glycerin, propylene glycol, methyl paraben, propyl paraben, and distilled water were heated to 70°C. The extract was dissolved in the aqueous phase. The aqueous phase was slowly added to the oil phase with constant stirring to form an emulsion. The formulation was allowed to cool with continuous stirring. The pH was adjusted between 5.5–6.5. Four formulations (F1C–F4C) were prepared with varying extract concentrations.

Table 1: Composition of Herbal Cream

S. No.	Ingredients	F1C	F2C	F3C	F4C
1.	Allotropic gigantean	1.2 gm	2 g	2.4 g	2.8g
2.	Stearic acid	0.4 gm	0.4 g	0.8 g	0.4 g
3.	Cetyl alcohol	1.2 gm	1.2 g	0.8 g	1.2 g
4.	Glycerin	2 gm	2g	1.6g	2 g
5.	Propylene glycol	1.2g	1.2 g	1.6g	1.2 g
6.	Beeswax	1.2 g	1.2 g	1 g	1.2 g
7.	Lanolin	0.8 g	0.8 g	0.6 g	0.8g
8.	Liquid paraffin	2 g	2 g	2.4 g	2 g
9.	Methyl paraben	0.08 g	0.08g	0.072 g	0.08g
10.	Propyl paraben	0.04 g	0.04 g	0.032g	0.04 g
11.	Distilled water	Q.S	Q.S	Q.S	Q.S

Evaluation Parameters

The prepared creams were evaluated for:

Organoleptic properties (color, odor, texture, state), pH determination, Homogeneity

Spreadability (S = m × L / T), Irritancy test, Phase separation, Washability

Results and Discussion

Fig.1: Prepared herbal cream

Table 2: Physical Parameters

Sr.No	Parameters	F1C	F2C	F3C	F4C
1.	Colour	Faint Yellow	Faint Yellow	Faint Yellow	**Faint Yellow**
2.	Odour	Pleasant	Pleasant	Pleasant	**Pleasant**
3.	Texture	Smooth	Smooth	Smooth	**Smooth**
4.	**State**	**Semi Solid**	**Semi Solid**	**Semi Solid**	**Semi Solid**

Table 3: Irritancy Test

Sr.No	Formulation	Irritant Effect	Erythema	Edema
1.	F1C	Nil	Nil	Nil
2.	F2C	Nil	Nil	Nil
3.	F3C	Nil	Nil	Nil
4.	F4C	Nil	Nil	Nil

Table 4: Spredability Test

Sr.No	Formulation	Time (sec)	Spreadability (gcm/sec)
1.	F1C	7	2.14
2.	F2C	4	3
3.	F3C	6	2.5
4.	F4C	5	2.7

Table 5: Washability Test

Sr.No	Formulation	Washability
1.	F1C	Washable
2.	F2C	Washable
3.	F3C	Washable
4.	F4C	Washable

Table 6: Phase separation

Sr.No	Formulation	Phase separation
1.	F1C	No Phase separation
2.	F2C	No Phase separation
3.	F3C	No Phase separation
4.	F4C	No Phase separation

Table 7: P^H Test

Sr.No	Formulation	pH
1.	**F1C**	**7.3**
2.	**F2C**	**6.6**
3.	**F3C**	**6.8**
4.	**F4C**	**7.0**

Discussion

The present research work entitled Preparation and Evaluation of a Herbal Cream Formulated from *Calotropis gigantea* was undertaken to develop a stable and effective topical herbal formulation using the leaves of Calotropis gigantea and to evaluate its physicochemical and biological properties. The study began with the collection, authentication, drying, and extraction of the plant material. The maceration extract was subjected to preliminary phytochemical screening, which confirmed the presence of important bioactive constituents such as flavonoids, alkaloids, tannins, and other secondary metabolites. These phytoconstituents are well documented for their antimicrobial, anti-inflammatory, wound-healing activities. An oil-in-water (O/W) type herbal cream was formulated using suitable excipients to ensure stability, spreadability, and patient compliance. Different trial formulations were prepared, and an optimized formulation was selected based on evaluation parameters.

Conclusion

The formulation and evaluation of a herbal cream using the leaves of *Calotropis gigantea* demonstrated promising outcomes in terms of physicochemical stability, therapeutic potential, and dermatological safety. Phytochemical analysis confirmed the presence of bioactive compounds such as flavonoids, alkaloids, and tannins, which are responsible for the observed antimicrobial, anti-inflammatory, and wound-healing activities.

The optimized cream formulation exhibited desirable properties observed in F2C formulation including appropriate pH, adequate viscosity, good spreadability, and stability over the study period. Furthermore, the absence of significant skin irritation during safety assessment suggests that the formulation is suitable for topical application. Compared to conventional synthetic creams, the developed herbal formulation offers a safer, eco-friendly, and cost-effective alternative, minimizing exposure to harmful chemicals and synthetic additives.

However, further investigations including:

- Detailed pharmacological studies
- Clinical trials in human subjects
- Long-term stability studies
- Enhancement of formulation techniques for improved bioavailability are required to establish its clinical efficacy and commercial applicability.

In conclusion, the herbal cream formulated from *Calotropis gigantea* leaves represents a promising natural dermatological preparation. With continued research and development, it has the potential to serve as a sustainable and effective alternative for the management of various skin disorders.

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Conflict of Interests

The authors declare no conflict of interest

Ethics Approval

Not applicable

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AI Tool Declaration

The authors declare that no AI and related tools are used to write the scientific content of this manuscript.

Data Availability

Data will be available on request

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